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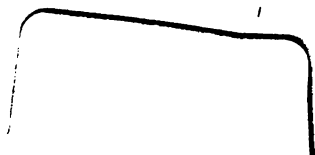
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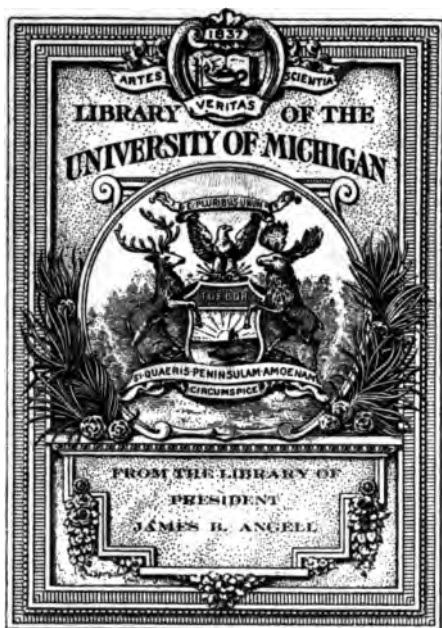
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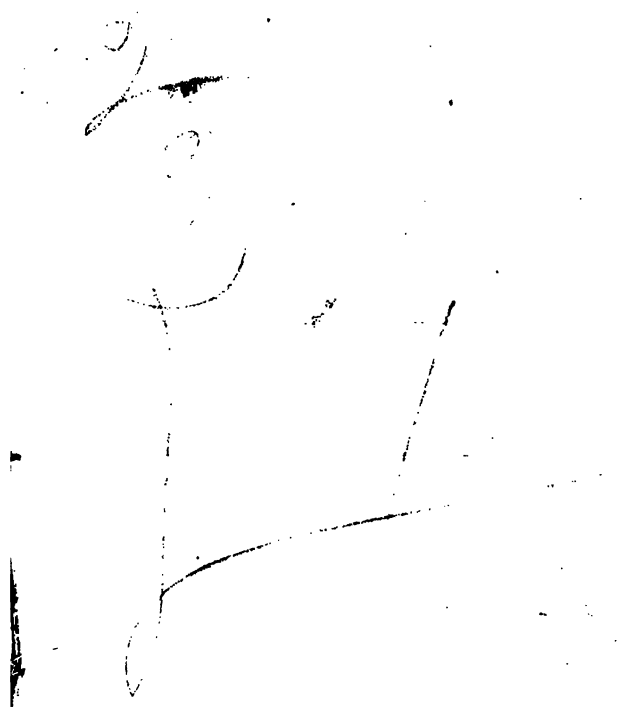
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PART II.

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BANVARD'S LIBRARY SERIES.

THE

YOUNG OBSERVERS;

OR

HOW TO LEARN WITHOUT BOOKS.

IN THREE PARTS.

PART II.

original BY
REV. J. BANVARD, A. M.,

AUTHOR OF "THE TOPICAL QUESTION BOOK," "PRACTICAL
QUESTION BOOK," ETC. ETC.

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NOTE.

We cannot begin too early to teach children the habit of observation, and especially to direct their attention to the works of the Creator. The various departments of Natural History abound with facts of the most curious and instructive character, many of which are particularly adapted to interest youthful minds. As children are fond of stories, parents cannot furnish them a more entertaining amusement than to relate to them these facts. The present series of volumes consist of information of this nature, presented in the form of discoveries and conversations. Some portions have reference to insects. If any regard these creatures as too insignificant for their attention, it will do no harm to remind such individuals, that anything which it was not beneath God to make, is not beneath us to examine. The feelings of aversion which many

persons experience towards different insects, are the result of association, or of false impressions, for which these despised creatures are not at all accountable. A knowledge of their history and habits would soon remove these impressions, and then, instead of aversion, our surprise and admiration will be awakened, at the wisdom and goodness which are exhibited in their structure, and in their peculiar adaptedness to their respective modes of life.

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VOL. II. 2



THE YOUNG OBSERVERS.

CHAPTER I.

AN ADVENTURE IN SHADOWY DELL.

"Do come along," said Emily to her brothers with a degree of impatience, as they were leaving the door-yard of a friend's house, where they had passed the day, "do come along."

"What is your haste, Emmy?" asked William, in his usual moderate way.

"Why, it is almost night, and we have got a long way to walk, and you know I don't like to go through Shadowy Dell after dark."

Shadowy Dell was the remains of what was once an extensive forest. It lay in an opposite direction from the woods where the

children discovered the ants, so that Mr. Rogers' house was situated between the latter place and the spot which was the object of Emily's dread. It was a low, moist place, and as the trees grew thickly together, producing even at mid-day a deep shade, it was termed Shadowy Dell. Common report says, that the deceptive light called Jack-o'-lantern has been seen there, which is not improbable, considering the nature of the ground.


Emily, that she might *feel* more safe, took each of her brothers by the hand, and walked between them. She was timid, and a little out of humor, which she soon exhibited in her conversation.

"I don't see," said she, "why Mrs. Smith didn't get our tea earlier; she *knew* that we had that ugly place to go through."

"Perhaps it was not her fault," replied William.

"Whose fault could it be? she has the whole control of the family, and can make all the rest do just as she pleases."

"Not quite, I guess," said Robert; "I heard her tell Harry to go after the cows



early in the afternoon, and not play by the way. But he was gone a long time, and when he returned she scolded him. It was more his fault than hers that we had tea so late."

"All that I wish, then," said Emily, "is that Harry Jones had to go through Shadowy Dell alone after dark."

"I don't believe he would mind that," said her younger brother, "for I noticed that he was a bold, impudent boy, and said a good many things that I would not dare to say."

"Impudence is no proof of courage," replied William. "There is Thomas Brown—he is the most impudent boy in the school; he contradicts the master, and uses language to him that no other boy dares to, and he cares no more for a whipping than an old donkey, and yet he is the most cowardly boy I know. His father can't get him to go out to the barn after dark, although it is only a short distance from the house, and he can see the lights burning in the room all the time."

"I should think," said his brother, "that

a boy who had courage to be impudent when he knew he would be whipped for it, would have courage to go in the dark."

"No matter what you think about it, it is not so. Father says, that cowardice is a companion of wickedness, and I know that Thomas Brown possesses both these. He is as cowardly as he is bad."

In a few minutes the conversation was dropped, and the children hastened on in silence. The sun was almost down. The trees and bushes cast lengthened shadows on the ground. Bees and other insects were winging their way home, except gnats and mosquitoes, which seemed to fill the air. The crickets were chirping in every direction, and a few solitary birds were offering up their evening song.

They soon entered the uneven, crooked path which led through the dell, but did not find it so dark as they had expected. Trees had been cut down to make the path sufficiently wide for a cart to pass through, and the opening let in considerable light, and allowed them to see large patches of sky over their heads.

They had not proceeded far before Robert, whose eyes had been wandering in every direction, spied something ahead. "What is that?" said he, suddenly stopping and pointing to the object which had caught his attention. As they had not been talking since they entered the dell, and as the ground was covered with a soft species of grass or moss, which prevented their footsteps from being heard, they had approached the animal quite near, without being discovered. It was about as large as an ordinary sized dog, and of a whitish-gray color. The tail was long, tapering, and covered with scales. The head was sharp, the ears short, and the nose, ears and paws almost free of the wool which covered the other parts of its body. When the children saw that they were undiscovered, they stepped cautiously out of the cart path, and concealed themselves behind some trees, that they might observe its habits. They noticed that its motions on the ground were very awkward, but when it ascended a tree, it moved about among the branches with great quickness and ease. Sometimes

it would leap from limb to limb, sometimes it would hang by its tail, reach a limb below with its fore paws and then drop upon it; or if it was after nuts or fruit when it suspended itself in this manner, it would get them and then raise itself to its former position. What surprised the children most, was the sudden appearance of several small ones. Whilst the old one was sitting upon one of the largest branches of the tree, a number of young ones were seen clinging to her, or else playing about on the limb; but where they came from, the boys could not tell. They were not there when the old one ascended the tree, neither did they climb up afterwards. Presently they all gathered around their mother, as the large one seemed to be, and disappeared. "Where have they gone now?" whispered Robert.

"That's more than I know," answered his brother. In a few moments the old one descended to the ground, and moved clumsily about in the path. The children looked up in the tree, but could see none of the small ones there; but when their eyes returned to the old one on the ground, they

were astonished to see her almost covered with young.

"How under the sun did they get there?" whispered Robert again.

"I don't know," was William's brief reply.

"They did n't come down the tree with her, nor after her," whispered Robert; "I should like to know how they got there. Let's try to catch one."

"Well."

The children noticed that the young ones would occasionally hide themselves, either under or behind their mother, but they could not tell which.

"There they go, there they go," whispered Robert hastily, "they are all concealed under the old one. Let us make a dash at them, frighten her off, and then catch one. I think they are too young to hurt us."

"Emmy, you come too," said William; for he thought his sister might be unwilling to remain behind the trees alone.

"Oh, don't go," whispered the timid little

girl; "throw a stick and frighten them away."

"No, no," said Robert, "I should like to get one of these little fellows, and bring it up at home."

After a little more whispering, they agreed to rush out together from their concealment, and with a loud noise frighten the old one off. If she made any resistance, the two boys were to beat her with their clubs. If she fled, they were then to try to catch one of the young ones.

If either of the boys had met this animal here alone, he would have been frightened, but as they were together, they felt somewhat courageous."

"I will count," said William, "one—two—three in a low whisper, and then say aloud *now*, and as soon as I say, *now*, let us rush out."

Robert assented.

William whispered, "one, two, three," and then hollowed "now," as loud as he could. At the appointed signal, out sprang the boys, brandishing their cudgels, and shouting at the top of their voices; away

fled the strange animal as fast as possible, and ascended the first tree it came to. The astonishment of the boys was great when they found no young ones.

"I am certain," said Robert, "that I saw them go either under or behind her, and I am sure they did not leave her, for I kept my eyes upon her all the time."

"This is the very spot where she sat," replied his brother, at the same time looking down upon the ground, "and there are no holes here into which they could have fled."

"I should like to know where the little rogues are." They looked up into the tree to which the animal retreated, and saw her clinging to one of the branches. As they found that she was afraid of them, they felt more courageous than they would have done, if she had shown any disposition to attack them. They therefore paused a few moments, to watch her. Presently their surprise was greater than ever; when they saw two or three of the young ones gradually creep from under the old one, and commence playing around her.

"That beats all," said Robert; "there is some mystery about it. How can those cunning fellows pass from the branches of the tree to the ground, and then from the ground to the tree again, without being seen?"

"It is rather strange," replied his brother, "but I dare say pa has seen such animals, and he will tell us about it;—but come, we have staid here long enough; the sun will be down by the time we get through the woods."

"I should like to stay longer, but I suppose we ought to go," said Robert. After giving the cunning rogues a farewell look, the boys took their sister by the hand, and commenced running. As the excitement of the adventure was now over, they all felt a little timid, which served to quicken their steps. They dashed by flowers and berries, equally heedless of the fragrance of the one, and the tempting flavor of the others. Now and then a straggling branch of a blackberry or thimbleberry bush would catch them, but they would tear by with a scratching noise, which sometimes made

them fear that their clothes would require the use of the needle by the time they should arrive at home. Such was their speed, that in a few minutes they emerged from the gloomy shadows of the dell, into the open meadows. A cloudless sky was over them, with here and there a faint star, which the twilight rendered visible.

"Oh, there is pa," said Emily, "he has come to meet us;" and drawing her hand from her brothers', she ran to receive his affectionate embrace.

"Oh, how glad I am to see you, pa."

"What kept you so late, my daughter? we have been expecting you home for more than an hour."

"Why, Mrs. Smith didn't get tea till late, and then we met with an old ugly thing in that dark dell—I wish that dell was n't there."

"What ugly thing?"

"I don't know; the boys can tell you all about it."

"Oh, father, we have had an adventure," said Robert, who by this time had come up.

"I should think you had, from your appearance ; you look as if you had been running a race with John Gilpin. But what have you seen ?"

The boys then related their adventure in the dell, and asked their father what kind of an animal it was, which they had seen.

"From your description, I should think it was an opossum. It is a very peculiar animal, exceedingly timid, and seldom seen in the day time. Probably you would not have seen that one, if it had not been near sun-down, and if it had not been much darker in the dell than in the open land. It is very clumsy on the ground, but in the trees it can move about with great ease. It uses its tail to assist its motions. When necessary, it can suspend the whole weight of its body by its tail. This it often does when reaching after birds' eggs or fruit, which it cannot obtain in any other way. Its hind feet are somewhat similar to our hands, by having short fleshy thumbs. They are so constructed that the animal can take a firm grasp of a very small twig, as well as of good sized branches. It feeds

upon apples, persimmons, birds' eggs, and sometimes small animals.

When it perceives that danger is at hand, instead of fleeing farther and farther from its pursuers, it will cling to the branch of a tree, and remain motionless. When this is the case, the hunters usually ascend the tree, and shake the branch violently, until the animal drops off. As soon as it falls, it moves a few steps from where it struck, and then rolls or doubles itself into as small a compass as possible. In this position it pretends to be dead. At such times it is perfectly quiet, and will allow itself to be roughly handled, without making the least noise or motion. I have sometimes taken a stick and rolled them over and over several times, without making them show the least signs of life, and if I had not known their habits of deception, I should certainly have thought they were dead."

"That explains," said William, "an expression the boys sometimes use."

"What is that?"

"Why, when one boy is trying to deceive

another, they say, 'he is playing the *possum*.'"

"But, father, what became of the young ones?" asked Robert; "they were the most mysterious characters; they could appear and disappear, just when and where they chose."

"I dare say it seemed so to you, but I can easily unravel the mystery. One of the most remarkable peculiarities of this animal is, that the female has a pouch or sack under her body, for the protection of her young. This pouch has an opening. It is something like a man's waistcoat, with two or three of the buttons unbuttoned. When danger is at hand, the young ones immediately flee into this pouch, and are there more safe than chickens are under the wings of the hen. Probably, when you saw those little ones disappear, it was in this manner."

"Yes," said Robert, "that explains it all. Those little rogues fled into their mother's pocket, and then she crept up and down the tree with them."

"When the young become so large that

they cannot resort to this retreat for protection, they then cling to their mother by twisting the extremity of their tail around hers, or else around her legs. Sometimes a half a dozen may be seen hanging to their parent in that way. As long as you had such an interesting adventure, I am not sorry you came home so late."

They had now reached their home, and the conversation ended.



CHAPTER II.

SENSITIVE PLANTS.

"How glad I am that winter is over," said Emily to her brothers, one pleasant spring morning, as they were leaving the house for a short walk.

"I thought you was very much pleased when winter came."

"So I was. The first storm we had, looked beautiful. I wanted to sit by the window, and watch the falling flakes all day. You don't know how singular it seemed to look up towards the sky when it was snowing."

"Yes, I do," replied her younger brother. "The air was filled with millions of flakes flying before the wind. Some would overtake others, and, by uniting with them, would make large flakes; others would dart about in different directions, as if they were rogues fleeing from the pursuit of consta-

bles; and all were hurrying on as if engaged in some important business."

"I used to think," said William, "that they looked more like a great army retreating before an enemy. The large ones I called the officers, and the small ones soldiers."

"Did you ever try, Emmy, to fix your eye upon a single flake, as high as you could see, and then watch it till it reached the ground?"

"Yes, many a time I have picked out a good large one and said to myself, I will see if I can't follow that fellow till he lights; but I seldom could succeed. He would dodge about so in the air, and there would be so many other flakes in the way, that I got confused, and could not tell which was the one that I was trying to keep track of."

"And now you say you are glad that winter is over?"

"Why, yes: I don't want it to be winter always. We get tired of anything when it lasts too long."

"That's true," said Robert. "I like winter well enough; I love to be on the ice."

or coasting down hill, or riding in a sleigh, listening to the merry jingling of the bells; but after a while I get tired of these and want something else."

"That's just what father tells us; he says, 'the human mind loves variety.' I have heard him repeat that a great many times."

"Perhaps that is the reason why I love the spring, after we have had winter," said Emily.

"Who can help loving such a morning as this?" replied her brother.

It was indeed a beautiful day. Every vestige of snow was gone. In its place the young grass covered the fields, giving them a fresh and lively appearance. Various kinds of trees and bushes were covered with blossoms and young leaves, which filled the air with a pleasant perfume. The songsters of the grove were making sweet melody with their notes, and the industrious bee was buzzing about among the flowers, absorbing their delicious nectar. "See that bird," said Emily, as she pointed to one that was flying through the air with

something trailing behind her; "I should think that she had been tied with threads, and had broken loose."

"No, no," replied William; "this is the birds' building season, and that little thing has probably got some tow in her bill, with which to line her nest, so as to make it comfortable for her young."

"That explains what I saw a few days ago," said Robert.

"What was that?"

"Why, I was standing in the barn door, waiting for Betsy to milk the cows, and two or three birds lighted down in the barnyard, and a moment after flew away with some straw in their mouths."

"Why have you not mentioned this before?"

"Because I thought that the birds were after the grain that might have been scattered there, and that in their attempts to get it, the straw stuck to their bills."

"Oh, no," said William; "they were building their nests, and used straw for the materials. If you had followed them you might have seen where they were building."

and then you would have been much interested in watching them."

"I'll look out and not get so deceived another time," said Robert. Each side of the road where they were now walking was lined with barberry bushes. The children had often been here when the berries were ripe, and stripped the bushes. "I wonder if there will be many barberries this year?" said Emily.

"I should think, judging from the great number of blossoms, that there would be," answered William. "Father says, when there are a good many blossoms, we may expect considerable fruit."

"Oh, what a grand time we shall have then, in the summer," continued the little girl, and away she darted to the side of the road and broke off a cluster of blossoms.

"The botany class bring flowers to school," she continued, "pick them to pieces, and call it analyzing."

"If that's the way to study botany," said Robert, "I am old enough to learn; so give me some of your blossoms, Emmy."

"I have none to spare," said Emily,

"but you can get some from the bushes." Robert stepped to the side of the road and broke off a little branch containing two or three clusters, and then began to play the teacher. He ran two or three steps ahead of his brother and sister, then turned round so as to face them, and began his mock instruction.

"When you want to learn botany," said this new self-made teacher, "you must take a flower in one hand, so,"—at the same time reaching forth his left hand, with a single barberry blow between his thumb and finger,—“and a pin in the other hand, so,”—holding up his right hand with a pin in it,—“and then you must gradually pick the flower to pieces, so.” He suited the action to the word, and carefully brought his pin in contact with the centre of the flower, as if pretending to be afraid of hurting it. The effect surprised him. “What does that mean?” said he, in a low voice, very different from the lively, spirited tones he had used a moment before. He repeated the thing which had attracted his attention two

or three times, and then suddenly asked William, if flowers could feel.

"I should think not."

"I should think that this one did," continued Robert; "for when I put the point of a pin on one of these little stems, it springs, just as if it didn't like to be touched."

"Let's see," said William and Emily, at the same time drawing up close to their brother. Robert pulled off a fresh blossom, and holding it low, so that his sister could see, began his experiment. "Do you see these little threads or stems, that meet in the middle of the flower?"

"Yes,"

"You notice that they are all lying back upon the leaves of the flower, like the spokes of a wheel?"

"Yes."

"Now I will touch two or three of them with a pin, close down to the bottom." Robert then held his pin as perpendicularly as he could, and touched the point to the lower end of the little stems, and immediately every one that he touched raised itself

from its reclining position, and stood upright. He then touched the others, and the same result followed; so that instead of resembling the spokes of a wheel, Emily said they looked "like a bunch of broomsticks." "Let me see if I can do it," she continued. So she tore off a flower from the cluster that she held in her hand, then took a pin from her dress, and went through the experiment as successfully as her brother. "I guess we tickle the flower, and that makes it kick," said she.

"I don't know whether we tickle, or hurt it; but it certainly seems as if the flower had feeling."

"Perhaps there is something in the nature of the pin that does it," said William; "may be it is kind of magnetic." After pausing and thinking a moment, he added, "If that is the case, then nothing but a pin or the same kind of metal will produce the effect—I will try." He took his bunch of flowers, sat down on a stone by the roadside, and began his experiments. First he took the stem of a leaf and touched the flower just as Robert had done, and the

same results followed—the little ~~stems~~ immediately rose upright. Then he took a small twig, then a small sliver of wood, after that a piece of straw, and touched them, and at each time he was successful. “No, it is n’t the nature of the pin that does it,” said William.

“How do you know?”

“Because anything else will answer just as well as a pin.” Here was a discovery. The children had never heard that some plants exhibited a certain kind of sensibility, and therefore what they now saw was entirely new to them. So anxious were they to have the phenomenon explained, that they concluded to return immediately home.

“Let us go back across the fields,” said Robert, “it is a great deal nearer.” They walked along the road until they came to a pair of bars. Robert climbed over, but William being the more thoughtful of the two, let down a couple of them for his sister to creep through. After following her, he carefully replaced the bars, when they all proceeded homeward together, and in a *short time* reached the house.

"I fear you have taken too long a walk, my dear children," said their mother, as she met them at the door.

"Oh no, we have n't been walking all the time."

"What have you been doing then?"

"Why, I was playing teacher," said Robert, "and was making b'lieve teach botany, and when I touched a barberry blossom with a pin, it stirred."

"Then we all went to work," interrupted Emily, "to do the same thing."

"You must have been very good scholars, if you did just as your teacher showed you. But come, it is school time now. We will talk more about this by and by."

In the evening, after the children had learned their lessons for the morrow, the conversation turned upon their observations of the barberry blossom. Mr. Rogers told them that there were several plants called sensitive plants. "I once saw one in a hot-house," said he; "it was a low plant and bore white flowers arranged in heads. Its leaves were formed of four leaflets or little leaves united to one common stalk."

Its sensibility was so great that when I touched it very lightly, it shrunk and folded up its leaves just as if I hurt it."

"Did your touch kill it?"

"No. In a few minutes it resumed its former position. I touched it again, but more roughly than I did at first, and then, not only did the leaves fold themselves together, but the stems to which they were attached bent themselves towards the main stalk, as if seeking the protection of their parent stem."

"It acted almost as if it were an animal," said Robert. "How strange!"

"The keeper of the hot-house told me," continued their father, "that it went to sleep every night."

"Went to sleep?" said Emily, in tones of surprise; "a plant go to sleep! What did he mean, pa?"

"I asked him what he meant. 'Why,' says he, 'it folds its leaflets and bends its branches towards the main stem, just as it did when you touched it so roughly, and remains so all night, and that I call going to sleep. When the sun rises, the leaves

gradually unfold themselves, and the whole plant returns to its usual state, and then I say, it is awake.' Now the barberry is a species of sensitive plant. Those little stems that you saw move are called stamens, and so irritable are they, that by touching them at their base, a convulsive motion is produced. It is a very interesting experiment, which any one may perform."

"But, pa," asked William, who had been sitting in a thoughtful mood for some minutes, "is it known what makes the sensitive plant fold its leaves at night, and open them in the day?"

"The gardener told me, that he thought the light had great effect upon it. 'For,' said he, 'I once put a sensitive plant in a dark room in the day time. A little while after, I went with a very feeble light to examine it, and was surprised to find that it was all closed, just as if it had been night. I then got all the lamps we had in the house, lighted them, and had them brought suddenly into the room. In a few minutes the sensitive plant awoke, unfolded its

leaves, and stretched out its branches ; so I concluded that it was sensitive to the light, as well as to the touch.'"

"I guess the plant thought it was day," said Emily, "and the sun was rising."

"La !" said Robert, "it was tired of holding its limbs in one position, and when it woke up it wanted to stretch itself, just as pussy does when she awakes. If it had a mouth, I dare say it would have gaped too." This attempt at wit was rather a failure. It produced no other effect than to bring a faint smile upon the face of their mother.

Mr. Rogers, after telling his children that he would relate to them some more strange things about sensitive plants at another time, commended them to the protecting care of their Heavenly Father, and they separated for the night.

CHAPTER III.

VENUS' FLY TRAP.

THE next day, when the children went to school, they related their discovery to the scholars. "Oh," said Emily to a cluster of little girls about her own age, "I know how to make a barberry blossom move."

"How?" asked one of them.

"By tickling it."

"Ha, ha, ha," shouted boisterous Mary Barker, "who ever heard of tickling a flower?"

"You need not laugh so, Mary," replied Emily, "for if you don't believe me, I can prove it;"—and away she ran to a barberry bush that was growing in the field a short distance from the school-house, with a whole flock of girls after her. Emily had often told her playmates things which they did not know, which she had learned from her father, and they saw now, from her earnest manner of speaking, that she was

not deceiving them. In a few minutes they all returned with a bunch of blossoms. Emily took a seat on a stone, and all the girls clustered around her, to see the wonder. She then took an open flower from the bunch, and after showing her school-mates the stamens, lying upon the leaves, she gently touched them and they all arose. The children were pleasantly surprised.

"How curious!" said one.

"I wonder if I can do it?" said another.

"Let us try," replied a third; and before long each little girl was seen with a blossom in one hand, and a pin or small piece of stick in the other, busily engaged in the experiment.

William and Robert were employed in the same manner as Emily. A group of boys was gathered around each to see the flowers move. William was grave and sober in all that he said about it; but Robert was full of sport. Whenever he touched the stamens he would make some kind of speech, as if he was talking to them. "Come, Mr. Sleepy-head, it's time for you to get up," or "Well, Mr. Lazy Loller, let's

see if you have got any legs to-day;" and then he would make them rise. In a short time all the boys were engaged as the girls were. The poor barberry bush in the field, which was the only one near the school-house, was soon stripped of its blows to afford materials for experiments.

It was very amusing to hear the remarks which were made by the different children. "I don't see," said James Barker, "what makes them little threads or stems rise up so."

"I guess we hurt them," said Henry Randolph, "and they try to get out of the way."

"I think so too," said Richard Arnold, "for it's very reasonable to suppose that plants bleed. My father says, if you trim a grape-vine too much, or too late in the season, it will bleed to death; and if plants bleed, I don't see why they can't feel."

"Poh," said Robert, "he only meant that so much sap would run out that they could n't live."

"Do you mean to say," replied Richard, with considerable warmth, "that plants

don't bleed?" but without stopping for an answer, he added, "if you had dug as much blood-root as I have, you wouldn't say so; I have colored my fingers many a time with it; besides, just break off a sprig of celandine, and see if it don't bleed yellow blood." At this moment the conversation was interrupted by the ringing of the bell—the signal for them to enter the school and commence their studies.

After the school was dismissed, as the two brothers were on their way home, Robert told William what Richard Arnold had said, and asked him if he thought that plants could bleed. "I know," said William, "that if you cut blood-root it looks very red, and a red liquor runs from the wound; but how it is with celandine, I don't know. We can easily tell, however, for there is plenty of it growing this side of Mr. Riker's barn, and we have to pass right by the spot."

After continuing the conversation a few minutes longer, they arrived at the barn. William pointed out to his brother the celandine, and told him he might test what

Richard had said. Robert immediately broke off some branches, and found that wherever he wounded the celandine, a yellow liquor oozed out. On the ends of all the stems that he broke, was hanging a little yellow or orange-colored drop. He showed it to his brother, and asked him if he should call that blood.

"Why, no," was the reply; "you might just as well say that milk-weed bleeds white blood, because, when you break it, there comes out a white, milky substance, as to say, that celandine bleeds yellow blood."

"The truth is, that the sap of some plants is colored; in blood-root it is red, in milk-weed it is white, and in celandine it is yellow. When the limb of a tree or plant is cut off, and the sap runs out, farmers call it bleeding, and if so much sap escapes that the tree or plant dies, they say that it 'bled to death;' but they do not mean, by such language, that trees and plants have feeling."

In the evening, the children reminded their father of his promise to tell them more about sensitive plants.

"Oh, yes," said Emily, "I don't think I shall get sleepy before bed-time, if you *will* talk about sensitive plants, it is so interesting; will they do anything besides folding up their leaves, pa?"

"Yes, my daughter. It is said that there is a species of fern in our country, which is so sensitive, that it will wither upon being touched by the human hand, though no such effect is produced, if it be touched by any other substance."

"Indeed! it must then be a very tender plant."

"Perhaps it is. I have often thought that it was a very appropriate symbol of many of the pleasures of the world, which wither and perish even whilst we are enjoying them. I once saw a sensitive plant, more singular than that, and under circumstances which I think would make quite an interesting story."

"Do tell it to us, pa. We are always glad to hear your stories."

"Some years ago," commenced Mr. Rogers, "I had a brother, who was settled in *Newbern*, in North Carolina. He was af-

licted with a lingering and dangerous illness. The family kindly wrote to me every week, informing me of the gradual change which was produced by the progress of the disease. Like individuals afflicted with other lingering complaints, he was sometimes better, at other times worse. Finally, I received a letter stating that the disease was reaching a crisis, and so rapidly was my brother's constitution sinking under it, that it was evident to all, he could remain here but a few weeks, perhaps only a few days longer. The letter also stated that he had repeatedly expressed an earnest desire to see me before his death, but ~~had~~ never requested the family to inform me of it. When, however, I knew his strong desire to see me, I did not wait for an invitation. I had evidence to believe, that the distance at which we were apart, and the trouble and expense of the journey were the reasons which prevented him from requesting a visit. But to me these were not insurmountable objections. I immediately made preparations for the journey, or rather, I should say, the voyage; took the stage the

next day for New York, where I embarked on board a packet. In less than two weeks I stood by the bed side of my dying brother. He was exceedingly weak and emaciated, though sensible. The second day after my arrival, he breathed his last. He died in the triumphs of faith. Being 'absent from the body,' I have no doubt, 'he is present with the Lord.' Even at this distance of time, it affords me pleasure that I gratified the last wish of my brother, and allowed him the satisfaction of an interview before his death."

Mr. Rogers was sensibly affected as he narrated these events of the past. The tears filled his eyes, and he was obliged to wipe them repeatedly away. Emily, fearing that her father had forgotten the subject of his story, and not sympathizing very deeply in his feelings, said, in a low tone of voice, "The sensitive plant, papa, the sensitive plant."

"Yes, my daughter, I am coming to it. One morning after I had been to visit my brother's grave, and was returning to the house by a circuitous route through a plea-

ant valley, where I thought I could indulge in religious meditation without interruption, I heard the loud, coarse laugh of some individual, a short distance ahead. Upon raising my head from the ground, I saw one of the colored domestics of the family sitting down, and apparently watching something. He did not perceive my approach, and soon roared out again with a broad southern negro laugh, 'Yah, yah, yah, got him now, no get away dis time, massa fly.' My curiosity was awakened. I stepped up to the slave, and accosted him with 'Good morning, Billy, what have you found that pleases you so much?'

"'Flower catch de fly, massa, an hole im fast,' said he, at the same time pointing to the object that had interested him. It was a fly caught in the folds of a leaf, and struggling for liberty."

"How did it get there, pa," interrupted Robert?

"I will tell you in a moment, my son. I examined the flower somewhat closely. The leaves seemed to grow from the root. The stems or stalks were long, full of veins,

and had a fleshy appearance. At their ends were two lobes of peculiar form, something like the half of a round ball. These were united at the back by a kind of joint or hinge, so that they could open and fold together. The edges of these lobes were notched something like the teeth of a saw, only a great deal narrower, and on the inside of these lobes were three little thorns. Two of these lobes were closed, and in each was an imprisoned insect. It occurred to me, that perhaps it was a sensitive plant, and caught any unwary insect that might light upon these lobes. As I had plenty of leisure, I resolved to watch, and see whether my conjecture was true. So I seated myself upon a stone, at a short distance from the plant, but where I could distinctly see the open lobes. I had not sat there long, before an insect of some kind lighted upon one of them, and immediately the two parts of the lobes came together, and made him a prisoner."

"It was a real fly-trap," said Robert.

"Yes," replied his father, "and upon

inquiring, I learned that it was called Venus' fly-trap."

"Was there anything to draw the flies to it?" asked the thoughtful William.

"Yes, there was a moist, dewy substance on the leaves, of a sweet taste, and of which insects are fond. It was a delicious bait, placed in a fatal trap. I thought, as I gazed upon it—such is sin; it presents to us sweet enticements, and if we yield to them they become our ruin. How many have been destroyed by its deceitful allurements. It sparkles to the eye, is sweet to the taste, and fatal to the soul. As you would advise all little insects to avoid that honeyed flower, so I would advise all little children to shun sin, however pleasant and sweet it may seem to them. As first it biteth like a serpent, then stingeth like an adder."

"How long," asked William, "did the lobes that caught the flies, remain closed?"

"Whilst I was watching the plant," replied his father, "one of those that were closed when I first saw it, opened again, and a dead insect fell out. The lobes re-

main closed until the fly which is entrained, and then they return to their position. It is one of the most singular plants with which I am acquainted."



CHAPTER IV.

INSTINCT AND REASON.

As Mr. Rogers was much interested in the study of Natural History, he kept in one corner of his garden a small hive of bees, more, however, for the purpose of studying their habits, than for obtaining the honey which they made. He had conversed with his children so frequently concerning the history of the bee, and related to them so many facts respecting its industry, its docility, its mode of building its cells, its attachment to the queen bee, and its manner of swarming, that they were almost as much interested in observing its habits, as their father. They were accustomed to go out in all kinds of weather, and at different hours of the day, for the purpose of making their observations.

One day, as Robert was standing near the hive watching the industrious little insects as they returned with their loads of honey

or bee bread, he noticed that a wasp, after flying several times around the hive, as if reconnoitring the fort of an enemy, alighted upon the branch of a small bush which grew by the side of the bench on which the hive stood. This branch projected in front of the hive, so as to be almost opposite the door. The position of the wasp enabled it, without attracting much notice, to see everything which entered or left the hive. Robert wondered what it was after. He knew that bees had nothing to do with wasps, and therefore suspected that its visit was for no good purpose. He resolved to watch its movements. Presently a bee, which had been out in the field, and which had probably visited hundreds of flowers, returned with the honey it had gathered. As it alighted upon the little shelf or platform in front of the door of the hive, and before it had time to enter, the wasp suddenly darted upon it, and drew it towards the edge of the shelf, from which they both fell to the ground. Here a struggle took place between them: as the wasp was the stronger of the two, it mastered the bee, and

after tearing off its wings and head, flew away with the body. "Murder and robbery," said Robert to himself, as he saw the wasp flying away with a part of the mangled bee.

"Well, my son," said Mr. Rogers, who at this moment approached the hive, after having walked through the garden unobserved by Robert, "I am glad to find you watching so intently these diligent little creatures."

"Oh, pa, is that you? I wish you had been here a minute ago, to have seen a cruel wasp murder a bee, and then carry away its body."

"I wish I had, for I have heard of such things, but I never saw an instance. What do you think he did it for, Robert?"

"I suppose to eat, or perhaps to feed his young ones."

"But why did he take the body instead of the head of the bee?" Robert, after pausing a while, said he did not know.

"I will tell you then. In the body of the bee is a little sack which receives the honey which the bee extracts from the flowers.

When the bee comes home, it empties the contents of this sack into the cells prepared for its reception. Of this honey, wasps are very fond, and when they kill a bee, they carry off the body instead of the head, because it contains this honey-bag."

"The wasp, then, is a very knowing insect," said Robert.

"Why so?" asked his father, who desired to see how far his son would reason correctly on this subject.

"Because they know that bees possess honey, and that they conceal it in their bodies, and not in their heads."

"That is not all," said his father. "The one that you saw, displayed his sagacity in this manner:—instead of seizing the bee out in the fields, as it was flying from flower to flower, and when it was uncertain whether it contained any honey, it waited until the honey-gatherer had collected its load, and had returned home, when it pounced upon it, and secured its rich treasure. Its conduct was like that of certain pirates, of whom I have read, who allowed vessels on *their outward voyage* to pass unmolested,

but when they returned with a valuable cargo of foreign merchandize, attacked them and made them prizes."

"But do wasps have minds," asked Robert, "that they are able to think so far as that? You have sometimes told us that insects and animals were governed entirely by instinct."

"And I also told you, that sometimes instinct approached so near to reason that it seemed as if some creatures thought a little."

"But, pa, what is the difference between instinct and reason?"

"That is a question, my son, which I fear I cannot answer in a manner sufficiently simple for you to understand. I am willing, however, to try; and perhaps I shall be more successful, if I illustrate the difference, than if I merely define it. A creature which is governed only by instinct, does not think. It performs all its work without reflecting what will be the consequence. It does not first contrive a certain plan, and then proceed to carry that plan into execution, but it prosecutes its labors

without any previous reflection. For instance, when a bird is going to build a nest it does not reason in this way: 'I must first get some coarse sticks, or clay, to make the bottom of my nest; I must then get some straw and grass, and work them together, and after that, I must get some tow or feathers, with which to line the nest in order to make it warm;' but without any such previous contrivance, it gathers its materials, and rears its little dwelling. But man, who possesses reason, proceeds very differently. He considers, reflects, arranges with a great deal of forethought his plans, and then carries them into execution.

"There is another difference: instinct makes no improvement. The robin, the swallow, the goldfinch, and various other birds, build precisely the same kind of nests now, as they did hundreds of years ago. They make no improvement in them. The habits and modes of life, of all kinds of animals, fishes and insects, are the same as they always were. Besides, instinct soon reaches its highest state of perfection. It then stops. Beyond that point it cannot

pass. But reason exhibits the opposite of all this. It is constantly progressing. It learns more and more every day, and we have no evidence that there is any point of attainment beyond which reason cannot pass. Those who are governed by it, are continually making discoveries and improvements.

“Mankind first dwelt in caves and holes; after that, they erected rude huts of the most simple kind; upon these they made improvements, until now, their dwellings are of the most beautiful and durable character. Similar improvements have been made in materials for clothing. There was a time when silks, cottons, and woollens were not worn, because men had not learned how to make them.

“But although there is this wide difference between instinct and reason, yet sometimes they approach very near to each other.”

Robert, who had been listening attentively to the explanations of his father, here interrupted him by asking him what he

meant by saying that instinct and reason approached near to each other.

"I mean that the conduct of irrational creatures is sometimes so remarkably sagacious, that it seems as if they thought or reflected some. I recollect an instance, which is suggested to my mind by your account of what you have just seen, and as I have no doubt that it will interest you, I will relate it. As a gentleman was walking one day in his garden, he saw a wasp on the ground, with a fly nearly as large as itself. His curiosity was awakened to know what the wasp was about; he therefore knelt down to it as closely as he could without driving it away. He distinctly saw it cut off the head and part of the body of the fly; it then took with its claws the remaining portion, to which the wings were attached, and flew away. It had, however, hard work to get along, for after advancing a short distance, the breeze, which was gently blowing, took the wings of the fly, and blew both the insects around. The wasp could not manage its own wings *and those of the fly too.*"

"Did the wasp give up the attempt to carry the prize home?" asked Robert.

"No, but when it found that the wind was too strong for it to make much progress, it alighted on the ground, and deliberately sawed off, first one wing of the fly, and then the other, and having thus removed the cause of the difficulty, it easily flew away with its load."

"But, pa, was n't there some contrivance in that?"

"It seems very much like it, Robert, and that is the reason why I related the fact. It appears that when the wasp found that he could not bear off the whole of the fly, he knew enough to divide it into parts, so as to make the burden lighter; and even after it had made choice of a particular portion, and still found that it could not advance, it seems to have known what was the cause, and how to remove it. Its method was similar to that of a mariner, who, when he finds that by altering his course, or by the change of wind, some of his sails injure the progress of his vessel, takes them in."

"It was something like me," said Robert. "The other day as I was coming from school, it began to sprinkle. I put up my umbrella, to prevent myself from getting wet, but the wind was so strong that I could not hold it: I was almost blown away; so I had to shut it, and get home as well as I could without using it."

"A very good comparison, Robert; the wings of the fly operated upon the wasp just as your umbrella did upon you, and the wasp seems to have known, that in order to advance more rapidly through the air, it must remove the wings of the fly, just as you knew that in order to get home, your umbrella must be closed."

During this conversation, Robert and his father left the bee-hive, and took one of the paths which led towards the house, but before they reached the gate, they met William and his mother, who, a few moments before, had entered the garden. Robert related to them, in a few words, the conduct of the wasp which he had seen, and the story which he had just heard from his father, and then asked, "Do not

these things prove that insects know something?"

"Whether insects know anything or not," replied his mother, "we had an old cow once that I used to think knew something."

"What made you think so?" asked Robert.

"Why, we were in the habit of feeding her during a part of the year on parsnips, and generally we washed them for her; but one day, in consequence of being in a hurry, the boy carried her the parsnips unwashed, just as they were pulled from the ground, and her ladyship was so nice, that when she saw the condition they were in, all covered with dirt, she washed them herself before eating them."

"What! a cow wash parsnips?" asked Robert, in tones of surprise.

"Yes, she certainly did."

"How did she do it?"

"She took one of the parsnips in her mouth, put it into a tub of water which stood there, and out of which she usually drank, and holding it by its short tops, she moved

her head from side to side, till she washed off the dirt; afterwards she ate it. She then took several others, one by one, and went through the same process of cleansing."

"What do you think of that, pa?" asked Robert.

"I think she was quite an intelligent cow, my son."

"But do you not think she reasoned a little?"

"Perhaps she did, and perhaps she did not."

"It seems very much like it," said Mrs. Rogers. "It is plain that the cow knew three things; **first**, she knew that water would cleanse the **parsnips**; second, she knew that in order to **accomplish** this, the water and the **parsnips** must be brought in contact with each other, and, **thirdly**, as our minister says, she knew *how* to bring them in contact. There were two other things that evinced her sagacity. She might, with her horns, have tipped the tub of water over them, but, instead of this, *she took them up singly, and dipped them into*

the water, and that was by far the better way; but instead of putting them in the water and taking them immediately out, she moved her head from side to side, with the parsnip hanging from her mouth, and in that manner actually washed the dirt off. Now, was there not in all that some reasoning?"

"Why," said Mr. Rogers, "it is difficult to tell. It might have been nothing more than mere imitation. You said that the parsnips were usually washed for the cow; was the cow present when they were washed for her?"

"Oh, yes, they always took them to the tub, which stood near the pump, and washed them; the cow, in the meantime, looking on and waiting for them."

"That is an important fact to be considered. If the cow had never seen parsnips washed, her cleansing of them in the manner she did, would have exhibited a much higher degree of sagacity. But as she had often seen it done, it might have been nothing more than mere imitation."

"Perhaps it was," replied Mrs. Rogers, "for I recollect she would sometimes

down the bars, and get out of the pasture."

"A cow let down bars!" said William, "how did she do it?"

"In this way; she would put her head under the bar, raise it up a little, and work it to and fro, until she drew one end out of the hole, and made it fall to the ground. She would then serve others in the same manner, until she had let down enough to enable her to pass through. I think it probable that she learned how to do it by seeing how the bars were let down when she was driven out and into the pasture."

"That is to say," replied Mr. Rogers, "it was mere ~~imitation~~ imitation. She did what she had seen others do; and very likely she learned how to cleanse parsnips in the same way."

This explanation did not satisfy William. He could not see how a cow could wash parsnips or let down bars from imitation, without exercising a little thought.

The conversation was now interrupted by Emily, who came to inform her parents that company had arrived and were waiting for them.

CHAPTER V.

USEFULNESS OF INSECTS.

SOME days after the events had occurred, which were mentioned in the last chapter, as the children were walking through the orchard, Robert saw a caterpillar's nest in an apple tree, and as he pointed it out to William, he remarked, "What destructive things insects are."

"That may be," replied his brother, "and yet they are made for some wise purpose."

"It seems to me that they do more harm than good. Only think, how many trees the canker worms destroyed last summer. I heard Mr. Reed say, that he lost more than fifty dollars by them."

"Because canker worms do injury, that does not prove that all insects are injurious. Some other kinds may be very useful."

"Caterpillars are another kind; but they

are not very useful, are they?" asked Robert, with a smile.

"Why, yes," answered William.

"What, ~~caterpillars~~ useful?"

"Certainly. Father says, they are good for the birds. Many a bird has made a good dinner upon them, and if caterpillars and all other insects should be destroyed, many kinds of birds would find it difficult to get enough to eat."

"What I mean," said Robert, "is that they are not useful to men."

William doubted this, and yet he could not prove that it was incorrect. They agreed to submit the case to their father, for his opinion. Accordingly, when they returned to the house, William, after relating the conversation with his brother, asked Mr. Rogers whether he thought that insects were more injurious than useful? His father told him that the Creator was governed by wisdom and goodness in all his works, and to say that anything which he had made did more injury than good, was to express a sentiment which did the Creator no honor."

"But are not some insects," asked Robert, "very destructive?"

"Certainly," replied his father. "Locusts sometimes overrun whole countries, and devour every green thing which they can find. One kind of insects destroy grain, another devour fruit trees, another eat up our food. One kind of moths ruin clothes, another kind get into trunks and boxes, and even the solid wood of the beams and timbers of our dwellings, and completely destroy them. Do you know why I sprinkled ashes upon the young cucumber and squash vines in the garden?"

"You said *L* you did it to destroy the bugs."

"True; and if I had not done it, many of those plants would have been ruined. Besides all this, there are some insects which give great annoyance both to man and beast, and sometimes they destroy human life. But we ought not on these accounts to say that insects, as a whole, are more injurious than beneficial. We should remember that there are various other kinds, whose labors are highly profitable, and the advantage which

we gain from them, is probably greater than the loss occasioned by the others."

At this last remark of his father, Robert was somewhat surprised. He had formed his opinion of insects, in general, from the various species which are found in gardens and orchards, and which he knew were exceedingly destructive; he therefore asked his father what kinds he considered useful. His father told him, that all those species which made articles, which men could use for various important purposes, were beneficial.

"And what articles do they make?" asked the inquisitive boy.

"What kind of a dress has your mother got on?" was the interrogative reply of Mr. Rogers.

"Silk," answered Robert.

"Is silk a useful article?"

"I think it is, pa."

"You are correct; it is used for gowns, cloaks, hats, handkerchiefs, gloves, stockings, umbrellas, and numerous other purposes. Many thousands of yards are used

every year; now all this silk is made by insects."

"How strange! insects make silk?"

"Yes, a kind of worm or caterpillar spins the silk, and men manufacture it into the various articles which they want. You will allow, then, that silk-worms are useful."

"I can't deny it," replied Robert.

"How is it with bees?" continued Mr. Rogers; "are they useful or injurious?"

"They are useful," said Robert, after a moment's hesitation, who by this time began to have a different opinion of the value of insects from what he had cherished before.

"Certainly: if all the honey which bees in all parts of the world make in one year, were collected together in one place, it would make quite a large lake; and if all the bees-wax which they manufacture in the same time, were brought together, it would be almost enough to build a little city upon its shore."

"Oh, how I should like to live in such a place!" whispered Emily to her mother.

"It would be sweet living, my dear, to occupy a wax-house on the borders of a honey-lake. I should hope, however, that the sun would not shine very powerfully."

"Why not, mother?"

"Because it would be a sad misfortune, if, while we were gone to make a few calls, our house should melt down and run away."

This little digression was finished by Mr. Rogers' asking the boys what kind of ink they wrote with at school.

"Black ink," was their answer.

"Is black ink useful?" asked their father. The children could not help smiling; they all knew that ink was valuable, and they could not see the object of their father in asking such a simple question. He therefore answered it himself; and after dwelling upon the usefulness of the article, he informed the children that an important ingredient in ink was nut-galls, which grew upon trees, and were about as large as cherries, and that these nut-galls were produced by insects.

"I don't understand that," said William.

"How can these nut-galls grow upon trees, and yet be made by insects?"

"In this way. A certain kind of fly makes a very small hole in the bark of the oak; in this hole it deposits its egg. The sap oozes out and covers the egg, and a small wart or bunch makes its appearance over the spot. This increases in size, with the growth of the tree, until it is as large as a walnut. This is the gall, or, as some people term them, the nut-gall. In some places they are very numerous. These galls contain little cells, in which the worms live after they are hatched from the eggs which the fly left there. Take some of these galls, bruise them, put some copperas with them, and then pour on water or vinegar, and you will have ink. The gall-fly, then, is another insect which is highly useful. After we have written a letter with ink made from the labors of the fly, we are then dependent upon insects for wax to seal it."

"How so?" asked one of the boys.

"Why, gum lac, which is another valuable article, and which is used in making

sealing-wax, is produced by insects. Large quantities of this wax are manufactured into varnish, which you know is put on furniture to make it shine. Did you ever see any cochineal?"

"Yes," replied Robert; "I bought some a few days ago for mother to dye some silk with."

"Did you know what they were?"

"I thought they were seeds of some kind. I noticed when the apothecary put them up, that they were ~~off~~ a greyish color, and about the size of some kind of seeds."

"You are not the only one who has been led into that error. They are of the size, and have the appearance of some kind of seeds; and another resemblance between them is, they are found upon plants; yet they are—insects; each cochineal is a perfect insect. In South America they are considered so valuable, that the people take great pains to raise them. The manner of raising them is very singular. They live upon the Nopal plant, and remain fixed to ~~one~~

spot upon the plant during almost their whole life.

"The people place a few of the old insects upon one of the plants, at a certain season of the year, and in a few weeks they become thousands. The young ones scatter themselves over the plant, and after attaching themselves to some particular spot, remain there till they reach their full size. It is said that some planters inoculate the tree with the insect. They take a handful of the young cochineal and rub them on the tree. The young insects fasten themselves to the bark, and there remain, sucking nourishment from the sap until they come to maturity. There are some plantations containing more than fifty thousand trees, on which this insect is raised; and it is estimated that the quantity which is sent every year from South America, is worth more than ten hundred thousand dollars."

"I think Robert will not deny that cochineal is a useful insect," said William.

"I should like to have our orchard full of them," replied his brother; "I think

they would bring more than the apples will."

"There is another valuable insect which apothecaries sell, which perhaps you have seen," said Mr. Rogers.

"What is it, pa?"

"Spanish flies, my son. In some diseases blisters are very useful. I have no doubt that there are many cases where blisters have been the means of curing diseases, and thus of saving lives. Now, Spanish flies are so powerful, that if ground to a powder and made into a plaster and laid upon the skin, in a few hours they will produce a blister, and they are generally used for this purpose by physicians."

"Are they those beautiful green flies which the apothecary keeps in a glass jar?" asked Robert.

"They are."

"Then I have seen them, and I have wondered what they were used for."

"Even locusts, which I have said sometimes overrun whole countries, and destroy all kinds of vegetation, are not exclusively

injurious," continued Mr. Rogers; "some nations use them for food."

"What!" exclaimed Robert, "people eat locusts! why it seems to me that I would as soon eat a spider. How should you like to have a plate of locusts for dinner, William?"

"I should have to be a great deal more hungry than I am now," answered his brother, "before I could eat them."

"Your feelings of aversion, my children, arise altogether from early education and association. If it was as common for us to eat locusts as it is to eat birds, you would have no more aversion towards the one than the other. You have been in the habit of supposing that locusts were a loathsome kind of insect, which should always be avoided. Hence you have cherished the same feelings towards them that you have towards spiders. But if you had always lived among the Arabs, who are accustomed to gather and eat locusts, your feelings would have been different; you would then, provided you liked the taste of them, have eaten them as readily as you

now eat fish. Do you recollect what John the Baptist lived upon in the wilderness?"

"Yes, sir, the Testament says, 'locusts and wild honey,'" answered William; "but I always thought that what are there called locust were the fruit of some kind of tree. There are locust trees growing in this country, but they do not bear anything good for food, and I always supposed that the locust trees which grew in the country where John was, were of a different kind, and that their fruit was good to eat."

"Many persons have supposed so; but it is a mistake. The locusts that John the Baptist used for food were a species of insect.

"The inhabitants of Eastern nations boil them, or roast them; sometimes they preserve a quantity of them in salt, and use them as they want them; it is one of the flying creeping things that the ~~Jews~~ were allowed to eat, by the ~~Mosaic~~ law; if you will hand me the Bible, Emily, I will find the passage which refers to it."

The little girl, who had been an attentive listener to the conversation, immedi-

ately left her seat, and brought her father the Scriptures. Mr. Rogers turned to the 11th chapter of the book of Leviticus, the twenty-first and twenty-second verses, and read as follows: "Yet these may ye eat, of every flying creeping thing that goeth upon all four, which have legs above their feet, to leap withal upon the earth; even these of them ye may eat; the locust after his kind, and the beetle after his kind, and the grasshopper after his kind."

"It appears, from this passage," continued Mr. Rogers, "that the Jews were permitted not only to eat locusts, but also certain other kinds of insects, such as beetles and grasshoppers: now, as some kind of insects supply us with materials for clothing, others with medicine, and others are used by some nations for food, or other valuable purposes, it seems to me that, on the whole, insects are more beneficial than injurious. Besides, they furnish food for birds, and for each other. This prevents them from becoming more numerous than they are. If they were not eaten by the birds and by each other, they would

become so abundant as to devour everything which we might plant, and in various other ways they would give us a great deal more annoyance than they do now."



CHAPTER VI.

MORE STORIES ABOUT INSTINCT.

AFTER the conversation which they had with their father about the instinct of animals, which is alluded to in Chap. IV. the children became much interested in that subject. They watched the movements of all the creatures which they saw, to ascertain if they did not exhibit something like reason. If the cow whisked her tail, to brush away the flies; if the horse, when being harnessed, bent down his head to receive the collar; if the cat went to the door, and mewed to have it opened; if the chickens came running to the house when the tablecloth was shaken; they would have a little discussion in their way, whether there was not something more than mere ~~instinct~~^{instinct} in it—something like reason.

When Mr. Rogers saw the interest which his children took in this subject, he was

much pleased, and in order to continue and increase it, he related to them other facts for their consideration. "Have you ever heard the story of Dr. Franklin and the ants?" said he to them one evening, when they were all collected in the parlor. They replied in the negative. "I will tell it then, as I have no doubt that it will afford you pleasure, besides furnishing you with materials for profitable conversation.

"Dr. Franklin, on one occasion, discovered a number of ants regaling themselves upon some molasses in one of his cupboards. Not being at all disposed to give such unwelcome visitors their board, he speedily put them to flight. In order to prevent them from finding access to this tempting bait in future, he took the pot, which contained the molasses, and suspended it from the ceiling by a string. Unfortunately, all of the ants were not put to flight; one remained with the molasses; and after the doctor had hung the pot where he supposed it would be perfectly safe from these marauders, this single ant was seen to ascend the string, cross the

ceiling and return to its nest. In less than half an hour a number of ants left their nest; ascended to the ceiling; passed over to where the string was tied; followed the string down to the pot, and ate the molasses. They continued to visit it in this manner, until it was all consumed. Having related to you the anecdote, I have now a question to ask; did those ants exhibit anything more than mere instinct?"

"I think they did," said Robert.

"Why so?"

"Because I can't see how instinct alone would teach those ants where the molasses was put, after it was taken from the cupboard."

"You might as well say," replied his father, "because you cannot see *how* it is that instinct teaches a bird to build its nest, therefore instinct does not teach it; or because you cannot see *how* it is that steam makes machinery work, therefore you do not believe that steam produces that effect. I do not mean by these remarks, Robert, that your *opinion* of those ants is a wrong one; I only want to show that the reason

which you assign for that opinion is not sound. Your *opinion* is, that those ants were not governed by mere instinct; the reason you give for your opinion is, that you *cannot see how* instinct alone will account for the facts. On the same principle, you ought not to believe that any results are produced by a certain cause, unless you can understand clearly *how* that cause operates. You ought not to believe that earth, water and air combine to make plants and trees, because you cannot see how such a combination can take place; you ought not to believe that heat converts wood into smoke and ashes, because you cannot see *how* heat can produce such effects. Now, whether your *opinion* of the ants is correct or not, the *reason* of that opinion is not sound. We believe in many operations, the precise mode of which, we do not comprehend. What is your opinion of those ants, William?" said Mr. Rogers, addressing his oldest son.

"I was thinking, that perhaps the ant which left the pot after it was hung by the

string from the ceiling, went and told the rest where it was."

"Ha, ha, ha!" laughed Robert, "that is the same as to say that ants can talk."

"They may not be able to talk," said Mr. Rogers, "and yet, perhaps they can, in some other way, communicate ideas to each other. It is supposed that they do it by rubbing each other's horns or feelers. It certainly is not very improbable that the ant, which left the molasses after it was put in a new place, by some means gave information of the change to its companions."

"Is it not more likely," said Robert, "that, after it went to the nest, it returned again to the molasses, and was followed by the others?"

"But why should the others follow it," asked his father, "if they did not know where it was going? and how could they have known where it was going, without being informed?"

"Perhaps they were guided by the scent of the molasses to the place of its concealment," said Mrs. Rogers, "for I have often

thought that they could tell by smelling, where food was placed."

"Or it may be," said her husband, "that the one which was left in the pot got some molasses on its feet, and when it returned to the nest it might have made a track; the others, by following this sweet track, would of course be led to the secreted treasure."

After some farther discussion in the family on the subject, Mr. Rogers said he would mention to them another fact, almost, if not quite as interesting as that of the ants. "There is a bird," said he, "called the hooded crow, which feeds on small shells. Some of the thin and tender kinds it breaks with its bill, or by beating them against the stones; but the larger and thicker shelled ones, it cannot destroy in this manner; it therefore resorts to a singular expedient to get at the meat. It seizes these large ones, and after carrying them to a considerable height in the air, it lets them fall upon the stones: this breaks the shell, and the bird is then able to devour the contents. If, in the first attempt, it is unsuccessful, that is,

if the shell does not break the first time the bird lets it fall, it seizes it a second or third time, and rises into the air, and, what is very remarkable, each time it ascends higher than it did before; this increases the power of the fall, and is more likely to break the shell."

This story, like the former, was the occasion of a discussion about instinct. William thought that the bird was governed by something more than instinct. He could not see why the bird should carry the shell into the air, and then let it fall, if it had not *thought* that by so doing the shell would break.

"Besides," said he, "why should the bird ascend higher each time, if it had not *thought* that that was the way to make the shell fall ~~more~~ heavily, and thus be more likely to break it? I think the bird must have reasoned a little."

"And why," said Mrs. Rogers, "should it let the shell fall on the stones instead of on the sand, or in the water? It would seem as if the bird knew that neither sand nor water would break the shells, and there-

fore, to accomplish its object, it must let them fall on stones." The question, however, like many others which they had discussed, was left unsettled, when the usual hour for retirement had arrived.



CHAPTER VII.

A STRANGE DISCOVERY.

"HURRA! hurra!" shouted Robert, as he rushed from the school-house one Wednesday noon, "hurra! a whole afternoon and no lessons. Farewell Mr. Arithmetic, good-bye Mr. Grammar till to-morrow morning!"

"You appear to be in fine glee," said Emily, as she followed him from the school-house door; "how do you intend to pass this afternoon, that the thoughts of it make you so happy?"

"Come with me, little pet, and you shall know; I shall want company."

"I guess^r you are going to take pa's advice, and see if you can't learn something without books."

"It won't be the first time if I do. I have learned many things which I never should have known, if pa had not told us so often to keep our eyes open and observe

things. I call myself a pretty good observer, Emmy."

"I know you sometimes come home with a great many questions," replied his sister, "about what you have seen or heard, and when our dear father answers them, it makes the evening pass away very pleasantly."

"And profitably too, you might have added; for he not only answers the questions I ask, but tells us many other things about the subject, and some of them are very curious."

After dinner, Robert and Emily obtained leave to go into the woods. They crossed one or two fields, and then took a path which had been made by the ox-cart when going to and fro after wood, and which led a long distance into the forest. The two children were in fine spirits. They would run along rapidly for a few minutes as if racing, then stop, look at a flower or bug which might attract their attention, then take each other by the hand and proceed more slowly to recover breath. If a bird or *squirrel* made its appearance, they would

pause a while, watch its movements, and then throw at it a small stick or stone, to see its manœuvres when frightened.

They had now gone a considerable distance into the forest. The tall trees reared their branches high over their heads, and almost shut out the light of the sun. The children began to be weary.

"I don't know how you feel, but I am tired," said Robert, as he seated himself upon the trunk of a tree which had been blown down and was partly decayed.

"So am I," replied Emily, as she took a seat by the side of her brother.

They had not been sitting there long, before they espied a number of ants creeping about in different directions.

"How busy these ants are," said Emily.

"Yes," said Robert, "they appear to be working as if they had no time to lose."

"Here is one that is travelling in haste; let us watch it and see where it goes."

"I guess he is a runaway," said Robert, "or perhaps he is carrying some important message."

The children carefully watched the straggler that had attracted their attention, and were amused to see how it would sometimes creep over and sometimes under the sticks and leaves which were in its way. It allowed nothing to stop its progress. If it came to an object which it could neither go over nor under, it would pass round it. Presently it reached a small bush or shrub, and began to climb up the trunk.

"Where is it going now?" asked Emily.

"We'll see," said Robert. The ant ascended the main trunk of the bush until it came to one of the largest branches; it then took that branch and followed it along to a cluster of leaves which were growing near its end. Here it paused. "What now?" said Robert; "has it met an enemy?"

Emily, who a moment before had left her seat that she might watch the wanderer more carefully, suddenly cried out,

"Oh Robert, Robert! here is a whole bunch of insects on these leaves, and I guess the ant has come to kill them."

"Then we shall have a battle," said her

brother. The children saw the ant go close up to one of the insects and touch it carefully with its feelers, or horns, upon the back. After waiting a moment, it began to strike it more rapidly, and then the ant put its head close to the side of the little creature, as if to bite it. This it repeated a number of times, and then went away. A number of the others did the same thing.

On another part of the bush, Robert noticed that some of these insects made a convulsive or jerking motion, by which a small drop of something was thrown from their bodies, which an ant immediately ran to, and eat.

When the children returned home they related the story of the ants, one supplying in the narrative what the other omitted. After they had finished, their father told them that he could explain it all, and that the explanation was very interesting.

"Ants," said he, "are very curious creatures. They are remarkable for their industry, their ingenuity, their courage, and their affection for their young. Many strange facts are related of them concerning

each of these particulars. But as it would occupy too much time for me to relate all that I know about them, I will confine myself to the singular habits which you observed to-day.

"The little insects to which the ants appeared to be so attentive, are called aphides, or plant-lice. They live upon the branches or leaves of plants. They are very social in their habits, that is, they live together like a society or family."

"That was the case with those that we saw," said Robert. "I should think there were as many as fifty in one group."

"These little insects," continued their father, "are furnished with very small suckers, which they insert into the bark of the tree or plant on which they live, and through which they are almost constantly drawing the sap. On each side of their body towards their back is a small tube or hole, and after the sap which they have eaten has passed through certain changes, it is discharged from these tubes. It is then very sweet and agreeable. This substance, *whether it is milk or honey*, ants are very

fond of. Whenever they see a drop of it oozing from the sides of their little favorites, they eat it off. On this account the aphides have been called ants' cows. What is most singular of all is, that when the ants are hungry, and none of this honeyed milk is to be seen upon their little cows, they know how to make them discharge it. In other words, they can milk their cows. It was this process which you saw this afternoon. It is done in this manner. The ants, with their long feelers or horns, at first gently touch the aphides upon their sides and back, as if caressing them. If the little insects do not take the hint and discharge some sweet milk, the ants then pat them very rapidly, first on one side, then on the other. In a short time the aphides raise their hind limbs, and from the tubes on their sides, a drop of the precious fluid oozes out, which the ants immediately consume. They then repeat the process till they can get no more. If one of these little cows does not satisfy their appetite they go to another and treat that in the same way."

"How strange!" said Robert. "But

you have not told us what those were doing which made the spasmodic motion I spoke of."

"When there are no ants near," continued their father, "or when they are not disposed to milk their cows, the aphides, by a sort of jerking motion, eject the fluid from them. Those which you saw were attended by an ant which immediately feasted upon the delicious nectar.

"Some species of ants carry the eggs of the aphides to their own nests, and there rear the young ones, that they may always have them at hand to supply their wants, Ants' nests have been discovered containing aphides walking about as much at home as our cows are in the pasture. When any danger threatened them, the ants would take them up and carry them away as carefully as a nurse would a child. They knew their value, and therefore were unwilling to have them destroyed."

"I shall always like the ants the more for that," said Emily.

"I don't know as you ought to," replied *Robert*; "for it is all selfishness in them.

They take good care of these insects simply because they get their living from them."

"At any rate," said William, who had been holding his head down for some minutes, thinking, "it shows the wisdom and goodness of the Creator, that one insect can live almost wholly upon another, without killing them."

"What do they feed their little cows upon when they have carried them to their nest?" asked Emily.

"Upon the roots of trees and plants," answered her father. "The ants select a place where there are such roots, and then build their nests in such a manner that the roots are inclosed within the nest, so that the aphides have as much as they can eat without going abroad."

"How ingenious," said William; "they seem to be almost able to reason."

"Yes, my son, there are many things in the conduct of irrational animals which seem to approach very near to the reasoning faculty. Even we might learn from them some profitable lessons. Let me remind you of what Solomon says: 'Go to the ant,

